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Release Notes
ION Dx1x1x0-56/15-x version 1.5

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Product name: ION (DC Brush, Brushless DC, Microstepping)
Source control archive name: 991100015
Date of build: 12/09/2009
Device Checksum: 0xFDA2C8F9

Description:
This document details bug fixes and changes for this release. This release incorporates all improvements made for version 1.4, which was not released.

Known Issues:

The current C-Motion release does not define enumeration values to be used with the GetFOCValue and GetCurrentLoopValue commands for retrieving I2t energy. The correct values are documented in the ION Digital Driver User's Manual; they are: o PMDCurrentLoopValueNodeI2tEnergy = 0x000A o PMDFOCValueNodeI2tEnergy = 0x000A
Home, Index or HSC captures cannot be triggered more frequently than every 52 microseconds.
Tracing PhaseCommand A/B always returns zero when CurrentControlMode is set to "FOC", even when Current Loop is disabled. This is an intended feature. Setting CurrentControlMode to "FOC", whether or not the current loop is enabled, causes space vector PWM to be used instead of triangular carrier PWM. The PhaseCommand A/B trace variables are not well-specified for SVPWM. FOC Alpha and Beta (non-rotating frame) outputs may be traced when using FOC mode.

Incompatibilities with previous version:

Space vector PWM modulation has been increased, see issue 64 below. Current and position loop settings may have to be changed.
Maximum PWM on and off time has been increased, see unnumbered issue in Drive section below.
If the device is operated in dual encoder mode, the auxiliary axis encoder is now used for sinusoidal commutation. In previous releases, the main axis encoder was always used for sinusoidal commutation. Dual encoder mode now works in the same way for ION 500 as it does for ION 3000.
The SetCurrentFoldback command now can set two different parameters, an energy limit and a continuous current limit. The behavior of this command is explained in the Magellan Motion Processor Programmer's Command Reference, Revision 2.5
The initial operating mode is now 0x1 instead of 0x31. See bug 20 below.

SignalStatus changes in dual encoder mode, see bug 27 below.	

Changes/Fixes:

Command Changes

60	Added option to GetFOCValue and GetCurrentLoopValue commands to retrieve I2t energy.

Communication Changes

	None

Protection Mechanism Changes

	None

Commutation Changes

40	Fixed glitch in current control that could occur when PWM and current loop were enabled simultaneously. Now waits 10 current loop cycles after enabling PWM to enable current loop.

Servo Filter Changes

	None

Drive Operation Changes

64	Space vector PWM modulation has been increased by approximately 7 % for brushless DC motors, providing higher current gain for the same bus voltage. Space vector PWM is used when the current control mode is set to 1, whether or not the current loop is enabled.
	The minimum PWM on time has been reduced from 6% to zero, and the maximum on time has been increased from 94% to 99%, allowing higher motor terminal voltages at high output.

Registers and Signals Changes

62	Fixed bug in communication with the I2C temperature sensor(s) that could result in losing control of the temperature sensors and LED controller.
98	Fixed issue with I2C communication that kept the data line in an undefined logic state for approximately 50 usec during each temperature sensor query.

Position Loop Changes

	None

Miscellaneous Changes

	None

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Changes/Fixes in version 1.4

Command Changes

	SetCurrentFoldback can now set two different parameters, an energy limit and a continuous current limit. See the Magellan Motion Processor Programmer's Command Reference, Revision 2.5

Communication Changes

	None

Protection Mechanism Changes

11212	When using Hall commutation the maximum current when in current foldback was too high. It is now correct.

Commutation Changes

90175	None in normal (single loop) mode. In dual loop mode (auxiliary encoder source = 0x101), commutation is performed using the auxiliary encoder, and phase correction is triggered by the HSI signal capture input.
22	Issuing an InitializePhase command if Hall commutation was specified would change the commutation mode to sinusoidal. InitializePhase is now a no-op if Hall commutation is specified.

Servo Filter Changes

11210	ClearPositionError could cause a drivative kick. Clearing the position error no longer causes a spike in the derivative control term.
90172	Tracing actual position now traces values with units of counts if the ActualPositionUnits flag is set. Previously it always used units of steps.
20	The initial value for OperatingMode was 0x31, which enabled the position loop and trajectory generator. This mode could lead to motion errors and position loop integral windup. The initial value for OperatingMode is now 0x1, which does not enable any control loops.

Drive Operation Changes

	None

Registers and Signals Changes

90175	Main encoder capture using HSI becomes meaningless in dual encoder mode. HSI is used for commutation index in dual encoder mode.
	The bandwidth of the analog Hall input filters has been increased. See the ION Digital Driver User's Manual for circuit details.

27	In dual encoder mode the state of the auxiliary index input (HSC input) was reflected in the primary axis SignalStatus register, and not the auxiliary axis SignalStatus register. In this release, in dual encoder mode, the Index bit of the primary axis SignalStatus register is always clear, and the auxiliary encoder index status is indicated by the Index bit of the auxiliary axis SignalStatus register.

Position Loop Changes

26	Phase correction was not applied until a SetPhaseCorrectionMode 1 command was issued, although it was documented as default. In dual encoder mode auxiliary axis capture did not work unless a SetPhaseCorrectionMode 1 command had been issued. Phase correction now works by default, and auxiliary axis capture is independent of phase correction mode.
90180	The commanded position was sometimes incorrectly rounded for non-unity step-to-count ratios. It is now correctly rounded.

Miscellaneous Changes

	None

Changes/Fixes in version 1.3

Command Changes

11202	Occasionally “Getdefault” would return wrong value, and “Setdefault” would fail to set the value. This is fixed.
90172	Tracing the actual position returned the position in steps and ignored the value of SetActualPositionUnits. This is fixed.
11203	Tracing auxiliary axis variables returned values on the primary axis. This is fixed.
90173	GetCaptureValue returned an incorrect positive value when the actual position was negative and encoder to step ratio was non-unity. This is fixed.

Communication Changes

	None

Protection Mechanism Changes

	None

Commutation Changes

	None

Servo Filter Changes

	None

Drive Operation Changes

	None

Registers and Signals Changes

	None

Miscellaneous Changes

	None

Changes/Fixes in version 1.2

Command Changes

	GetDefault now returns the requested setting even if the motor output is enabled. SetDefault still requires the motor output to be disabled when it is issued.
	GetTemperature now returns the average of the temperature sensors located in the system. Previously it returned the maximum of all connected sensors.
	The only valid parameter for Set/GetOutputMode with the ION digital drive is 7, representing PWM High/Low output.

Communication Changes

	A new serial communication protocol has been added. The protocol enum is 1. It is identical to the existing multidrop ide-line mode except that each response packet includes an address byte as the first byte of the response packet. The address byte contains the nodeID of the responding module. This new mode replaces the protocol modes 2 and 3, and should be used for all multidrop configurations. The previous modes are still supported, but not recommended.
	The default serial port mode when using RS-485 communication is now 0x84, which represents multidrop idle-line mode, 57600, n, 8, 1 with a nodeID = 0. In previous releases the default was 0x04.
	The maximum serial baud rate of 460,800 is now fully supported.
	The maximum bufferID has been increased from 0 to 1. This second buffer accesses the trace buffer and can be used to read the data on-the-fly when the trace mode has been set to rolling mode.

Protection Mechanism Changes

	An over-temperature condition is now determined by comparing the over-temperature limit with the average of the two sensor readings. Previously it was based on whichever sensor returned the highest reading.
	The maximum temperature limit is now 70 degrees Celsius. Previously the maximum was 75 degrees when over-temperature was determined based on the hottest sensor and not the average temperature. See the previous change.

Commutation Changes

	None

Servo Filter Changes

	None

Drive Operation Changes

	None

Registers and Signals Changes

	None

Miscellaneous Changes

	None

Changes/Fixes in version 1.1

Command Changes

149	GetPositionLoop Kout incorrectly sign extended the return value to 32-bits. This is fixed.

Communication Changes

	None

Protection Mechanism Changes

148	The foldback limit was not applied if the motor torque was negative. This is fixed.

Commutation Changes

123	A 90 degree phase difference existed when commutating a microstepping motor with FOC verses current loop. For this reason an abrupt jump would occur when switching between these two current control modes on the fly. This is fixed.

Servo Filter Changes

	None

Drive Operation Changes

139	A low pass filter was added to the reading of the bus voltage sensor. This generates a more accurate reading for comparison with the values set using SetBusVoltageLimits.
138	Due to an error when reading the temperature sensor, the value returned by GetTemperature could be inaccurate by +¼ degree Celcius. This is fixed.

Registers and Signals Changes

	None

Miscellaneous Changes

	The status LED “slow” blink rate is now twice as fast as it was in ION version 1.0.